## DETAILED ACTION

### *Response to Amendment*

1. Applicant's amendment filed on June 30, 2009 has been considered. Claims 3, 4, 14, 15, 28-40, 45 and 46 are cancelled. Claims 1, 2, 5-13, 16-27, 41-44 and 47-57 are under consideration.

### *Response to Arguments*

2. Applicant's arguments filed on June 30, 2009 have been fully considered but they are not persuasive. Applicant (at page 2, last paragraph, to page 3, second paragraph) argues,

> "The Office Action identifies certain limitations of the claimed exhaust gas treatment device which are allegedly disclosed by Robinson et al., but expressly and unequivocally concedes that Robinson et al. *do not* disclose or suggest an exhaust gas treatment device mounting mat containing ceramic fibers having the percent crystallinity or crystallite size as claimed in the present application. Furthermore, Robinson et al. do not provide any suggestion or motivation to treat the ceramic fibers to provide such crystallinity and crystallite size.
>
> Because the product of Robinson et al. does not disclose the claimed features of melt-formed ceramic fibers having that claimed percent crystallinity and crystalline size, the product of the instant claim is not substantially the same as the product of Robinson et al...."

Applicant's arguments with respect to Robinson et al., taken alone, are not found persuasive. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant (from page 3, last paragraph, to page 4, last paragraph) further argues that there would have been no reasonable expectation of success if the ceramic fibers of Myles were

substituted for the ceramic fibers in the support element of Robinson et al. Applicant asserts that the ceramic fibers of Myles, which were intended for lining a static furnace structure, would not be suitable for use in mechanically or thermally demanding dynamic environments, such as in an automotive exhaust gas treatment device.

The Examiner respectfully disagrees. Robinson et al. (see column 3, lines 40-39; see also column 2, lines 38-61) discloses that the characteristics which enable a mounting mat to operate successfully within a catalytic converter, e.g., in an automotive environment, include: i) good handleability and fabrication characteristics; ii) the capability to withstand high temperatures without degradation while maintaining stable pressure over a wide range of operating temperatures, e.g., from a low temperature of about 20 °C to high temperatures of at least about 1200 °C; and iii) flexibility without the need of additional means to maintain structural integrity.

Myles teaches ceramic fibers which may be formed into a mat or blanket, and the mat or blanket can be bent in an arc without producing significant cracking or breakage of the fibers (see column 2, lines 23-28; column 3, line 65 to column 4, line 10). Myles also teaches that the ceramic fibers are able to withstand high temperatures without degradation, given its ability to withstand temperatures of up to 1425 °C for 24 hours with minimal shrinkage (see column 2, lines 29-35). Given these properties, the Examiner asserts that one of ordinary skill in the art would have expected a mat produced from the ceramic fibers of Myles to be satisfactory in meeting the requirements set forth by Robinson et al.

Applicant (at page 5, first and second paragraphs) further argues,

> "The Office Action further alleges that the presently claimed holding pressure would be inherent, claiming "that the heat treating regimen of Myles is the same as or obvious over Applicant's own heating treatment regimen, a support element comprising

the ceramic fibers of Myles would inherently exhibit the necessary holding pressure. Applicants deny that the holding pressure of the currently claimed mounting mat is inherent in the Myles et al. teaching.

Page 8 of the Office Action alleges that Myles et al. show dramatically less shrinkage under high temperatures, and therefore it is alleged that this provides a stable pressure over a wide range of operating temperatures. Resistance to shrinkage is a different and independent property of the material than its ability of provide sufficient holding pressure. The holding pressure of the support element is a result of the heat treatment so that the element does not experience a permanent compression set. Nevertheless, and without acquiescing to the Examiner's position, Applicants submit "that which is inherent in the prior art, if not known at the time of the invention, cannot form a proper basis for rejecting the claimed invention as obvious under §103." See *In re Sherry,* 566 F.2d 81, 86, 195 U.S.PQ. 753, 756-57 (C.C.P.A. 1977). Obviousness cannot be predicated on what is not known at the time an invention is made, even if the inherency of a certain feature is later established. *In re Rijckaert,* 9 F.2d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993). The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic, *ld.; In re Oelrich,* 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). Because neither of the references teaches or suggests a material that was known to provide the claimed holding pressure, the references do not provide all of the limitations of the claims and therefore do not establish a *prima facie* case of obviousness."

Applicant (at page 7, first paragraph) further argues that,

"Myles et al. does not address holding forces. Therefore, it not predictable that a melt-formed blanket of Myles et al. would have the adequate holding force as described in Robinson et al. when Myles et al. does not even address holding force issues and the fiber of the Robinson et al. mat is of a different material (sol-gel fibers)".

The Examiner respectfully disagrees. The "holding forces" or "minimum residual pressure for holding said fragile structure within said housing" as recited in claims is an inherent or latent

property of a support element formed from the ceramic fiber product produced according to the process specified in the claims. This is further evidenced by Applicant's specification, at page 6, lines 12-22, which states that, "*When such fibers are employed*, the support mat provides a minimum pressure for holding the fragile catalyst support structure within the housing…".

Since the ceramic fibers of Myles are identical or substantially identical to the ceramic fibers being claimed, and the ceramic fibers of Myles are produced by a process which is identical or substantially identical to the process being claimed, the claimed properties or functions are presumed to be inherent.

Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the *prima facie* case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. *In re Best*, 562 F.2d at 1255, 195 USPQ at 433. See also *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2112.01.

In addition, the mere recognition of latent properties in the prior art does not render nonobvious an otherwise known invention, and the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See MPEP 2145.

In the instant case, one of ordinary skill in the art at the time the invention would have been motivated to substitute the heat treated, melt formed ceramic fibers of Myles for the ceramic fibers present in the support element **20** in the apparatus of Robinson et al., at least for the reasons that the ceramic fibers of Myles retain sufficient flexibility and show dramatically less shrinkage under high temperature use (see column 6, lines 4-11).

Applicant (at page 5, last paragraph, to page 6, last paragraph; see also page 8, second paragraph) further argues that Robinson et al. does not provide any motivation to utilize melt-formed ceramic fibers to form the support element. Applicant notes that Robinson et al. merely provides examples of ceramic fibers produced according to sol-gel processing. Applicant further asserts that Robinson et al. teaches away from the use of melt-formed ceramic fibers.

The Examiner respectfully disagrees and maintains that the disclosed examples of ceramic fibers formed according to a sol-gel process would not constitute a teaching away from the use of ceramic fibers formed according to alternative processes. Based on the broader disclosure, it would have been obvious for one of ordinary skill in the art to select other known ceramic fibers, so long as they met the requirements set forth at column 5, lines 50-58 of Robinson et al. See also MPEP 2123 regarding rejections over the prior art's broader disclosure instead of preferred embodiments.

Regarding Applicant's arguments (see page 7, last paragraph, to page 8, first paragraph) with respect to Langer and Johnson, the Examiner merely cited the references to evidence that the general use of "melt-spun and heat treated ceramic fibers" in dynamic, e.g., automotive, environments was knowledge readily available to those of ordinary skill in the art. Thus, one of ordinary skill in the art would have expected that the use of either a melt-spun or a sol-gel

formed ceramic fiber, for forming a support mat in a catalytic converter, to be satisfactory.

Applicant (at page 8, second to last paragraph) further argues,

> "…to the extent Myles et al. and Robinson et al. are combinable, there would nevertheless be no motivation to add an exogenous binder to the Myles et al. fiber. This is because Myles et al. teach a fiber that is sufficiently flexible without the addition of a binder."

The Examiner respectfully disagrees. A binder is often utilized to facilitate the handling of fibers during its formation into a mat or blanket structure. For example, the ceramic fibers and binder may be mixed together to form a slurry, and the slurry is then formed into a mat or blanket structure using conventional paper-making techniques. The binder is then "burned out" (hence, a sacrificial binder) in order to produce a support element containing only the ceramic fibers. See Applicant's specification, page 16, line 24 to page 18, line 6.

The primary reference to Robinson et al. similarly discloses a binder for facilitating the formation of the ceramic fibers into a mat structure, e.g., using conventional paper making techniques, wherein the binder comprises a sacrificial binder that is burned out of the mounting mat, leaving only the ceramic fibers in the final mounting mat product. (see column 5, lines 33-49; column 6, lines 3-46). There would not be an "exogenous binder" in the modified apparatus of Robinson et al., since the binder utilized during the mat formation step would be burned out to leave only the ceramic fibers (of Myles) in the final mounting mat product.

Applicant (at page 9, second paragraph, to page 11, second paragraph) further argues that there would have been no motivation to further apply the teachings of Sasaki et al. to the combination of Robinson et al. and Myles, since the references to Myles and Sasaki et al., as a whole, teach away from one another. In particular, Applicant notes that Sasaki et al. teaches that the ceramic fiber must be a mullite composition having a weight ratio of alumina to silica of

70/30 ~ 74/26. In contrast, Myles teaches ceramic fibers containing about 45 to about 65 weight percent alumina and from about 35 to about 60 weight percent silica, which is outside of the range specified by Sasaki et al.

The Examiner respectfully disagrees. The Sasaki et al. reference was merely relied upon for its general teaching of reducing the shot content in ceramic fibers, in order to maintain a uniform thermal conductivity in the support element/mat (with respect to claims 7, 18 and 51), and its general teaching of applying needling to a support element/mat of ceramic fibers, in order to increase its bulk density and prevent the separation or shifting of its layers (with respect to claims 41-44). The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 2, 5, 6, 8-13, 16, 17, 19-27, 47-50 and 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robinson et al. (US 5,580,532) in view of Myles (US 4,240,833).

Regarding claims 1, 8, 9, 12, 19-25, 47, 52, 53, 56 and 57, Robinson et al. (see FIG. 1; column 4, line 55 to column 7, line 40) discloses a device **10** comprising:

a housing **12** having an inlet **14** at one end and an outlet (not shown) at an opposite end through which exhaust gases flow; a fragile structure (i.e., monolith **18**) resiliently mounted within said housing, said fragile structure having an outer surface and an inlet end surface at one end in communication with said inlet **14** and an outlet end surface at an opposite end in communication with said outlet; and a support element (i.e., a mounting mat **20**) disposed between the housing **12** and the fragile structure **18**, said support element **20** comprising an integral, substantially non-expanding ply of polycrystalline ceramic fibers comprising about 40 weight percent to about 60 weight percent alumina and about 60 weight percent to about 40 weight percent silica (see column 5, lines 33-64). The support element **20** further comprises a sacrificial binder (see column 5, lines 33-36; column 6, lines 3-26).

The apparatus of Robinson et al. is the same as the instantly claimed apparatus, except that Robinson et al. is silent as to the ceramic fibers of the support element **20** comprising ceramic fibers which possess the physical properties of fibers that are formed according to the claimed time-temperature heating regimen.

Myles, however, teaches a ceramic fiber, suitable for forming a fiber blanket or mat to be

used in a high temperature apparatus (see column 3, line 65 to column 4, line 10), wherein said ceramic fiber is melt-formed and comprises about 40 wt.% to about 60 wt.% alumina and about 60 wt.% to about 40 wt.% silica (see column 2, lines 36-40). In particular, the ceramic fiber is prepared according to a time-temperature regimen of heating said fibers to a temperature of 990°C to at least 1050°C for greater than 1 hour, or heating said fibers to a sufficient temperature above the devitrification temperature of the fiber material for an effective amount of time to produce a microcrystalline fiber (see column 3, lines 12-64).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the heat treated, melt formed ceramic fibers of Myles for the ceramic fibers present in the support element **20** in the apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the ceramic fibers of Myles retain sufficient flexibility and show dramatically less shrinkage under high temperature use (see column 6, lines 4-11). Furthermore, the substitution of known equivalent structures involves only ordinary skill in the art, *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958); and when the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

Given that the time-temperature regimen as taught by Myles is identical to or substantially identical to the time-temperature regimen being claimed by Applicants, the heat treated ceramic fibers of Myles will be identical to or substantially identical to the instantly claimed ceramic fibers having a crystallite size of greater than 200 Å to about 500 Å, and a

crystallinity from about 5 to 50 percent.

And, even if the properties were not inherent, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select the appropriate time and temperature parameters for producing a ceramic fiber having the instantly claimed physical properties of crystallinity and crystallite size in the modified apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the specific crystallinity and crystallite size are not considered to confer patentability to the claim since the precise crystallinity and crystallite size would have been considered a result effective variable by one having ordinary skill in the art (see Myles: column 3, lines 21-58). Accordingly, one having ordinary skill in the art would have routinely optimized the heating time and temperature ranges for producing a suitable crystallinity and crystallite size in the polycrystalline ceramic fibers, to obtain the desired flexibility and shrink resistance, for instance, in the support element/mat for holding the fragile structure in Robinson et al., *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Because the modified apparatus of Robinson et al. comprises all of the instantly claimed components, the support element will inherently exhibit the specified minimum residual pressures for holding the fragile structure within the housing after 200 cycles of testing at 900 °C or after 1000 cycles of testing at 750 °C.

Regarding claims 2, 13 and 48, Robinson et al. further discloses that the fragile structure **18** has a perimeter, at least a portion of which is integrally wrapped by the support element **20**

(see FIG. 1; column 9, lines 26-30).

Regarding claims 5, 6, 16, 17, 49 and 50, Myles further teaches that the ceramic fibers have an average diameter ranging from about 1 micron to about 14 microns, or from about 3 microns to about 6.5 microns (see column 2, lines 50-53).

Regarding claims 10, 11, 26, 27, 54 and 55, Robinson et al. further discloses that the device may comprise a catalytic converter or a diesel particulate trap (see column 4 lines 55-62).

4. Claims 7, 18, 41-44 and 51 are rejected under 35 U.S.C. 103(a) as obvious over Robinson et al. (US 5,580,532) in view of Myles (US 4,240,833), as applied to claims 1, 9, 12 and 21, and further in view of Sasaki et al. (JP 07-286514).

Regarding claims 7, 18 and 51, Robinson discloses that the ceramic fibers should be substantially shot free, e.g., on the order of about 5 percent nominally or less (see column 5, line 65 to column 6, line 1). Sasaki et al. also teaches a ceramic fiber having a shot content of 5% by weight or less (see section [0007]). It would have been obvious for one of ordinary skill in the art at the time the invention was made to maintain a shot content of less than about 10% in the ceramic fibers forming the support element/mat in the modified apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because when larger amounts of shot are present in the ceramic fiber, the specific gravity of portions of the support element/mat increases, and thermal conductivity becomes uneven, resulting in an inability to evenly hold the fragile structure, as taught by Sasaki et al.

Regarding claims 41-44, the collective teaching of Robinson and Myles is silent as to the support element/mat being needled. Sasaki teaches a support element/mat comprising ceramic fibers, in which said support element/mat is needled (see sections [0008], [0009]). It would have

been obvious for one of ordinary skill in the art at the time the invention was made to provide needling to the support element/mat in the modified apparatus of Robinson et al., on the basis of suitability for the intended use and absent a showing of unexpected results thereof, because the needling orients some of the ceramic fibers in the vertical direction to tightly bind the support element/mat, so that the bulk density of the support element/mat is increased and separation or shifting of the layers of the support element/mat can be prevented, as taught by Sasaki et al.

***Conclusion***

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER A. LEUNG whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Walter D. Griffin can be reached on (571) 272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer A. Leung/
Primary Examiner, Art Unit 1797